

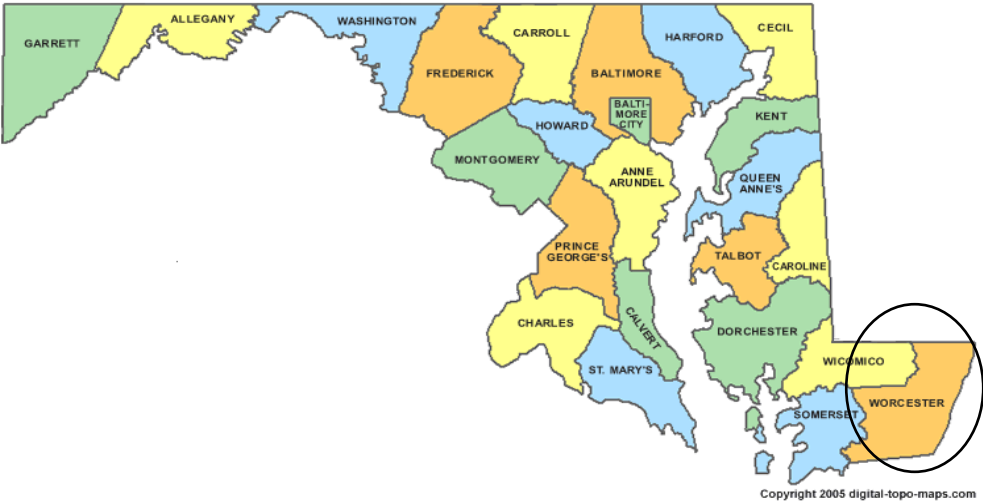
Investigation of Maryland's Coastal Bays



Presented by Craig Weedon,
Biologist
Coastal Fisheries Program
June 5, 2024

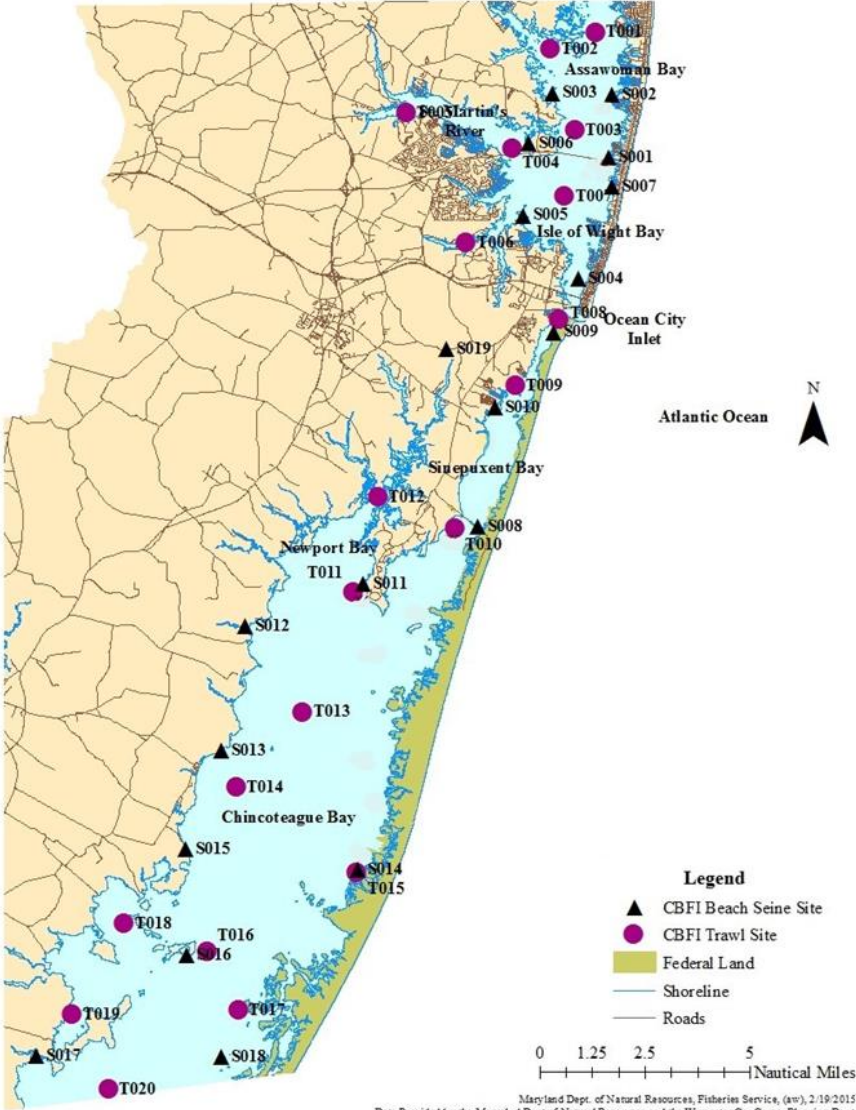


Overview



Surveys

- 1. Trawl Survey (1972 – present, standardized 1989)
- 2. Beach Seine Survey (1972 – present, standardized 1989)
- 3. Submerged Aquatic Vegetation Habitat Survey (2012 – present, standardized 2015)



Maryland Dept. of Natural Resources, Fisheries Service, (aw), 2/19/2015
Data Provided by the Maryland Dept. of Natural Resources and the Worcester Co. Comp. Planning Dept

Trawl Survey



Survey Overview

- 20 fixed sites each month April – October, 140 sites (trawls) per year
- Assawoman Bay to Chincoteague Bay
- A standard 16-foot semi-balloon trawl net used in areas with a depth greater than 3.5 feet
- Each trawl is a six-minute tow at a speed of 2.5 to 2.8 knots
- Area coverage is 1254.2 m²

Data Outputs

- Stock assessments for Summer Flounder, Black Sea Bass, and Atlantic Menhaden
- State Interstate Fishery Management Plan Compliance for above species and American Eel, Atlantic Croaker, Spot, Scup, and Weakfish
- US Fish & Wildlife Service Sport Fish Restoration Annual Report
- Government, Non-Governmental Organization, and Research data requests

Proportion of Catch by Month by Species (35-years)



Trawl	Apr	May	Jun	Jul	Aug	Sep	Oct	Spawning Season
American eel	26	25	23	14	9	3	1	Winter
Atlantic menhaden	1	30	47	10	6	3	4	Winter-Spring
Spot	1	16	33	21	15	10	4	Fall-Winter
Summer flounder	3	18	32	21	14	8	4	Fall-Winter
Atlantic silverside	6	2	35	32	5	15	5	Summer
Black sea bass	2	10	20	25	20	17	7	Summer
Weakfish	0	0	0	61	31	7	1	Spring-Summer
Pinfish	0	10	18	24	24	20	5	Fall-Winter
Bay anchovy	5	6	9	19	32	18	12	Summer
Silver perch	0	0	1	19	43	30	7	Spring
Sheepshead	3	0	0	9	9	20	60	Winter-Spring
Atlantic croaker	4	7	12	13	6	14	44	Summer-Fall-Winter

Beach Seine Survey



Survey Overview

- June and September
- 18 fixed sites from Assawoman Bay to Chincoteague Bay and one site in Ayres Creek.
- 38 sites (seine hauls) per year
- 100 ft X 6 ft X 0.25 inch mesh bag seine with a buoyed float line and a weighted footrope.
- Area coverage is 906.8 m²

Data Outputs

- Stock Assessments for Atlantic Menhaden, Spotted Seatrout and Black Drum
- State IFMP Compliance for above species, Summer flounder, Spot and Bluefish
- US Fish & Wildlife Service Sport Fish Restoration Annual Report
- Government, Non-Governmental Organization, and Research data requests

Proportion of Catch by Month by Species (35-years)



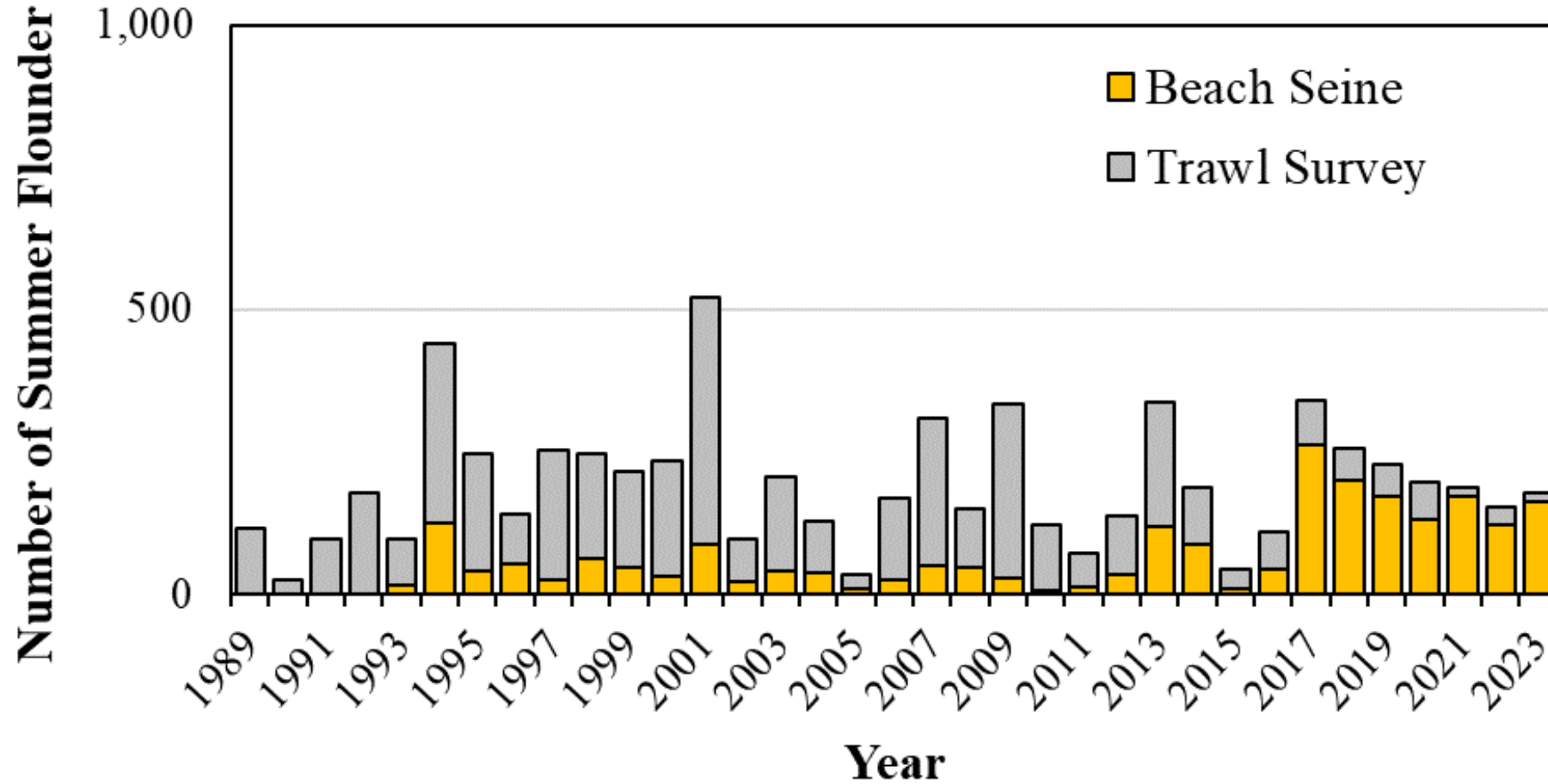
Beach Seine	Jun	Sep	Spawning Season
Pinfish	89	11	Fall-Winter
Atlantic croaker	82	18	Summer-Fall-Winter
Summer flounder	77	23	Fall-Winter
Spot	79	21	Fall-Winter
Black sea bass	77	23	Summer
Atlantic menhaden	75	25	Winter-Spring
American eel	71	29	Winter
Atlantic silverside	18	82	Summer
Bay anchovy	37	63	Summer
Sheepshead	6	94	Winter-Spring
Silver perch	2	98	Spring
Weakfish	2	98	Spring-Summer

2023 Geometric Mean Results

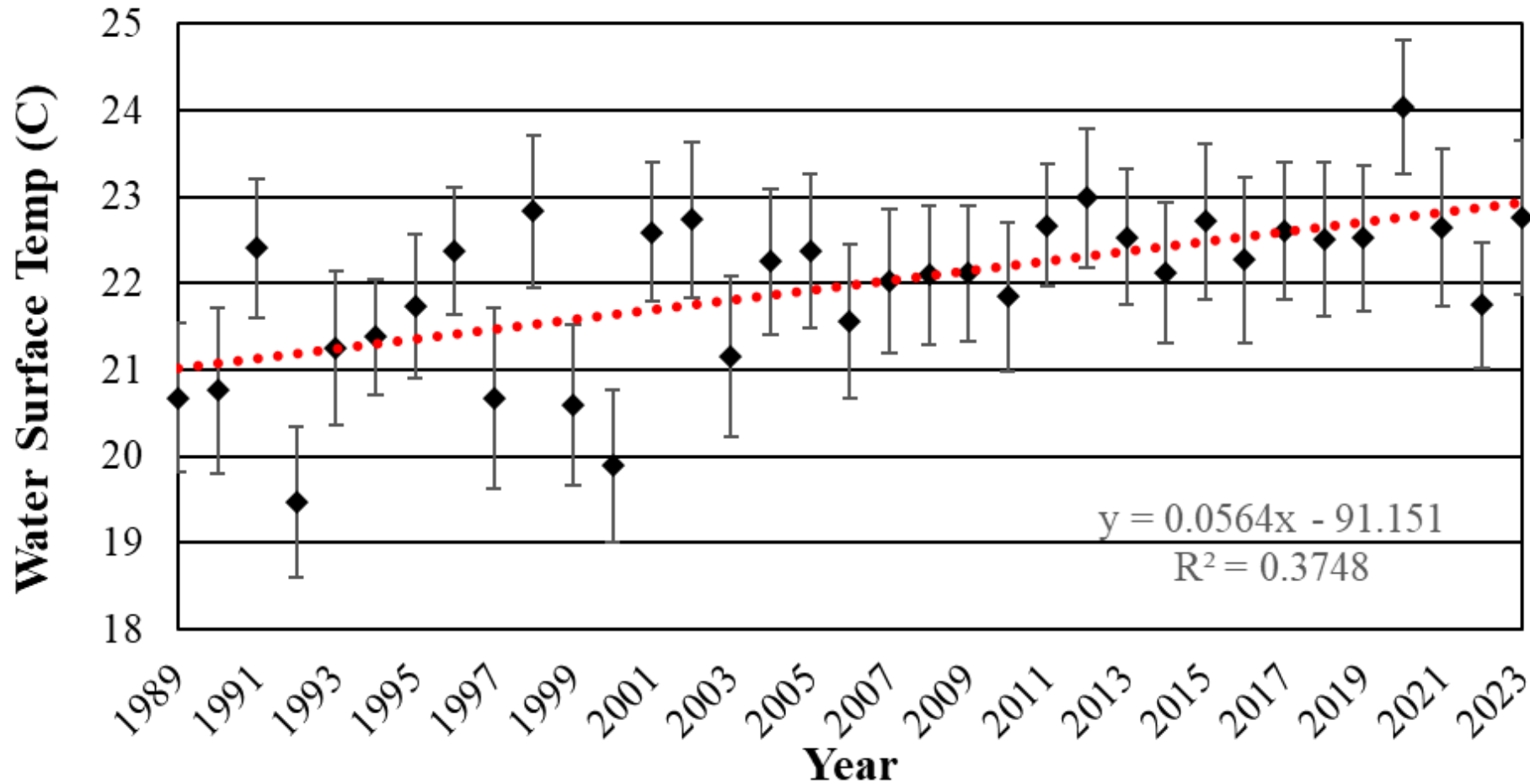


Species	Trawl Survey	Beach Seine Survey
Pinfish (<i>Lagodon rhomboides</i>)	Above	Equal
Atlantic menhaden (<i>Brevoortia tyrannus</i>)	Equal	Above
Spot (<i>Leiostomus xanthurus</i>)	Equal	Above
Black sea bass (<i>Centropristis striata</i>)	Equal	Equal
Sheepshead (<i>Archosargus probatocephalus</i>)	Equal	Below
Silver perch (<i>Bairdiella chrysoura</i>)	Equal	Below
Weakfish (<i>Cynoscion regalis</i>)	Equal	NA
Summer flounder (<i>Paralichthys dentatus</i>)	Below	Above
Atlantic croaker (<i>Micropogonias undulatus</i>)	Below	Equal
Atlantic silverside (<i>Menidia menidia</i>)	Below	Equal
Bay anchovy (<i>Anchoa mitchilli</i>)	Below	Below
Bluefish (<i>Pomatomus saltatrix</i>)	Below	Below
American eel (<i>Anguilla rostrata</i>)	Below	Below

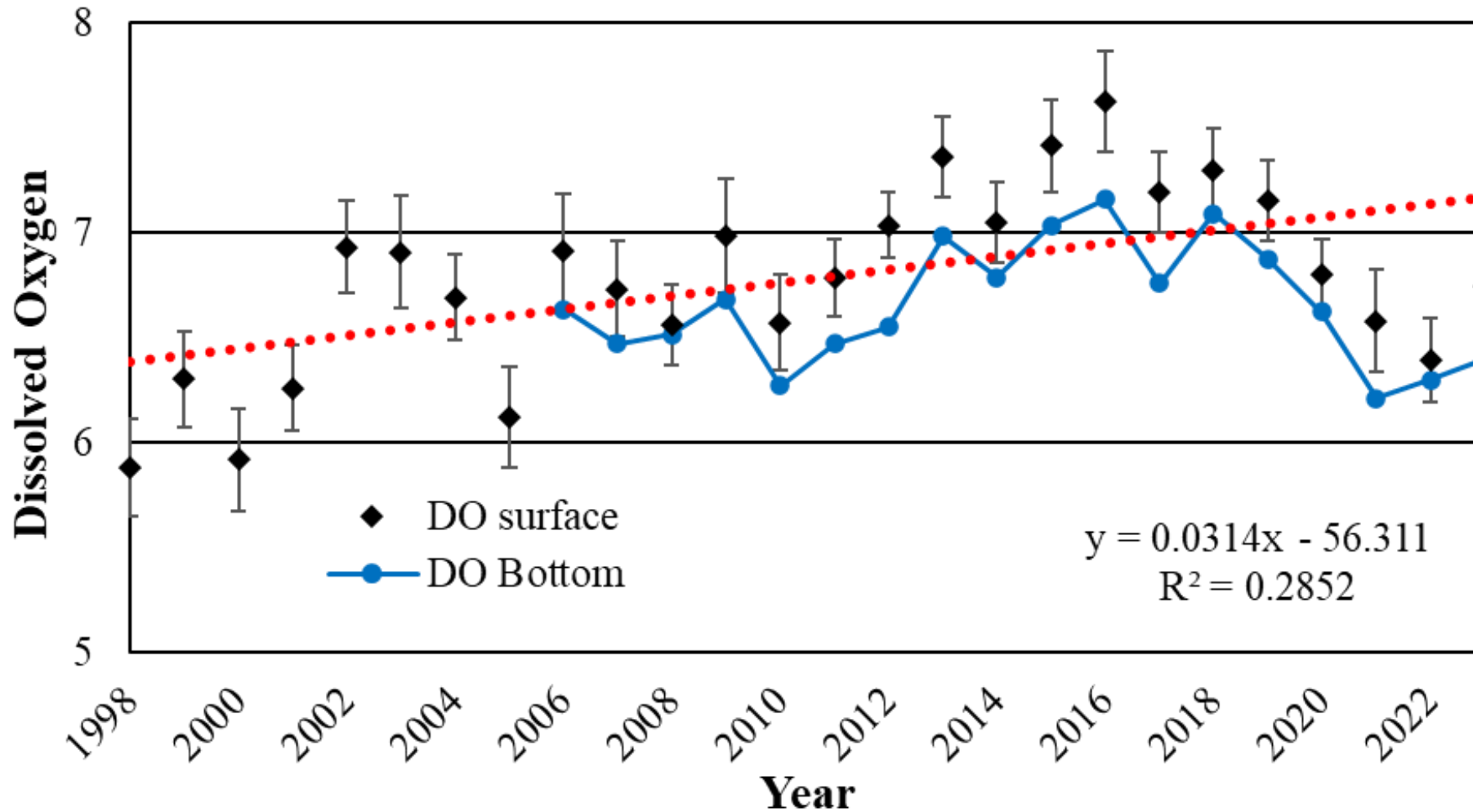
Summer Flounder Shift Towards Beach Habitat in June Over Time



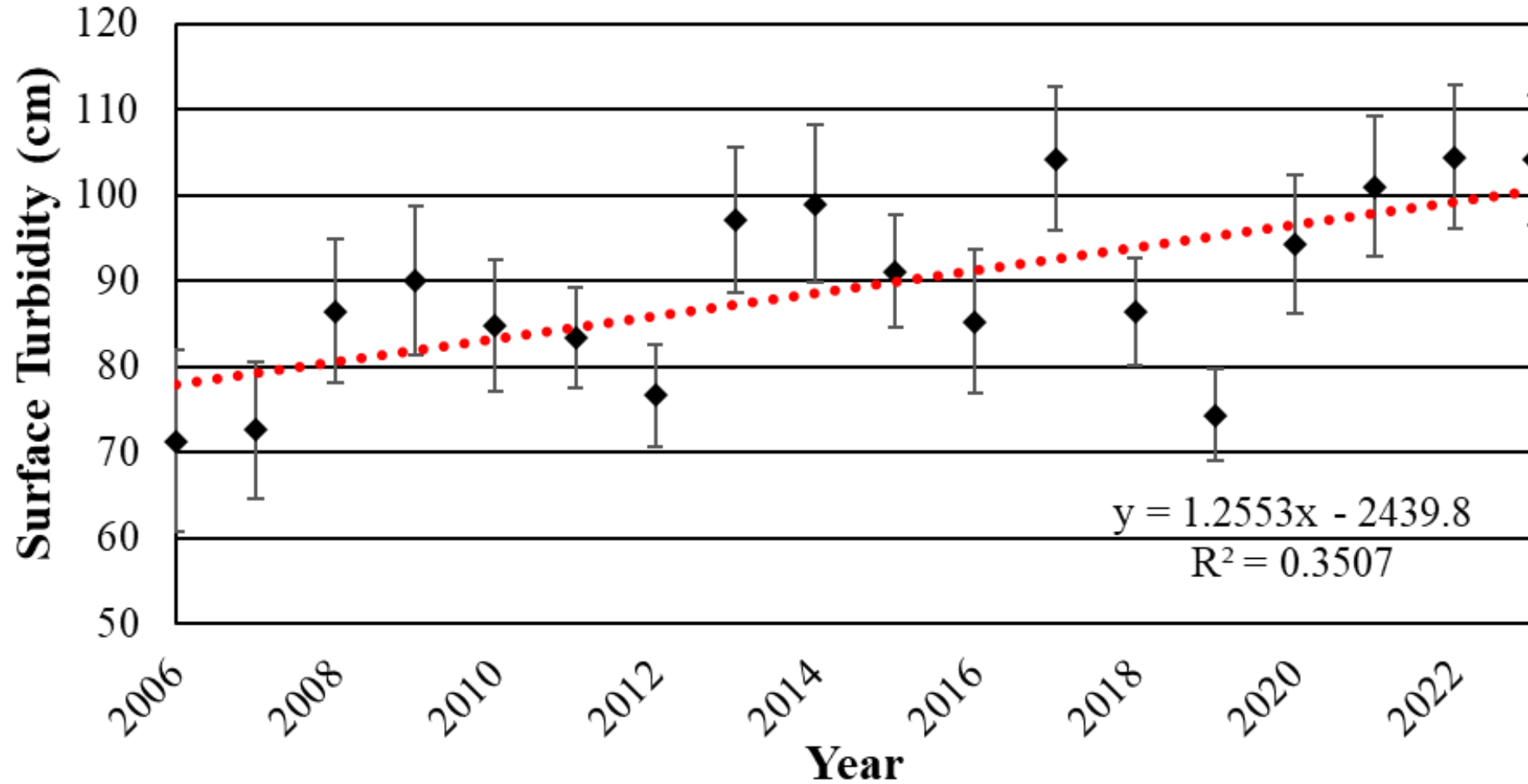
Trawl Survey Surface Annual Mean Temperature



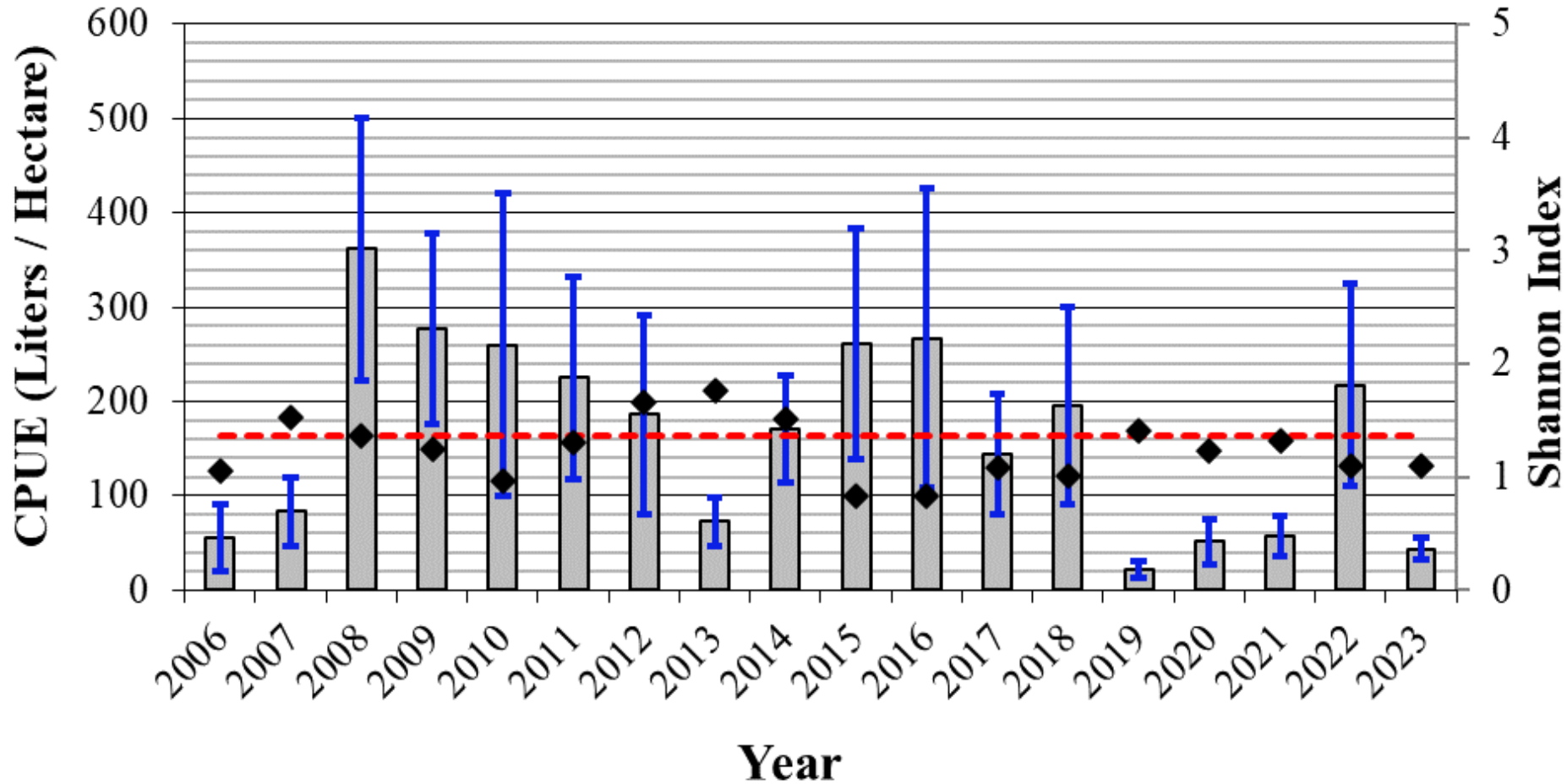
Trawl Survey Annual Mean Dissolved Oxygen



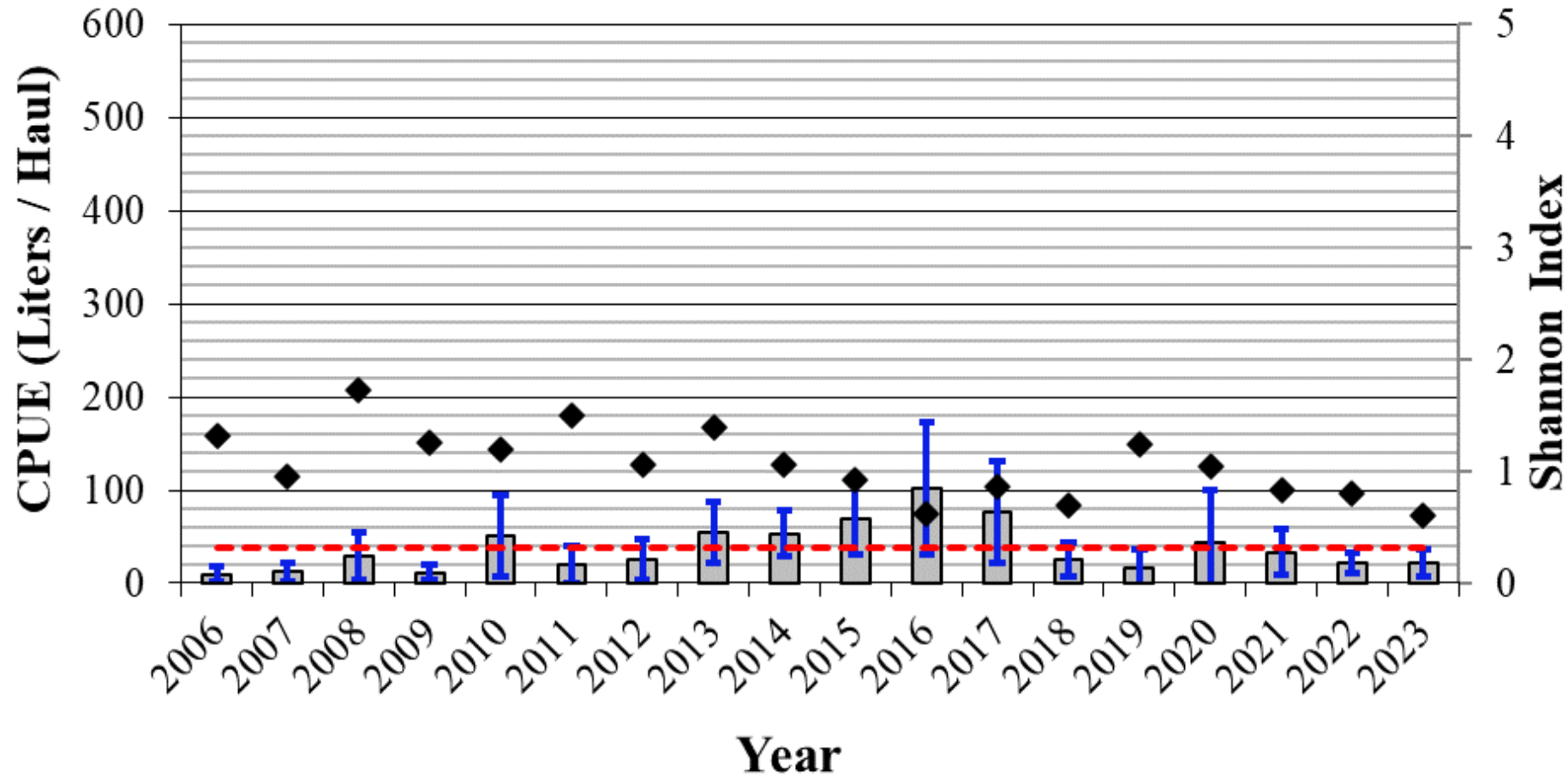
Trawl Survey Annual Mean Turbidity



Macroalgae Update Trawl Survey



Macroalgae Update Beach Seine Survey



Submerged Aquatic Vegetation Habitat Survey



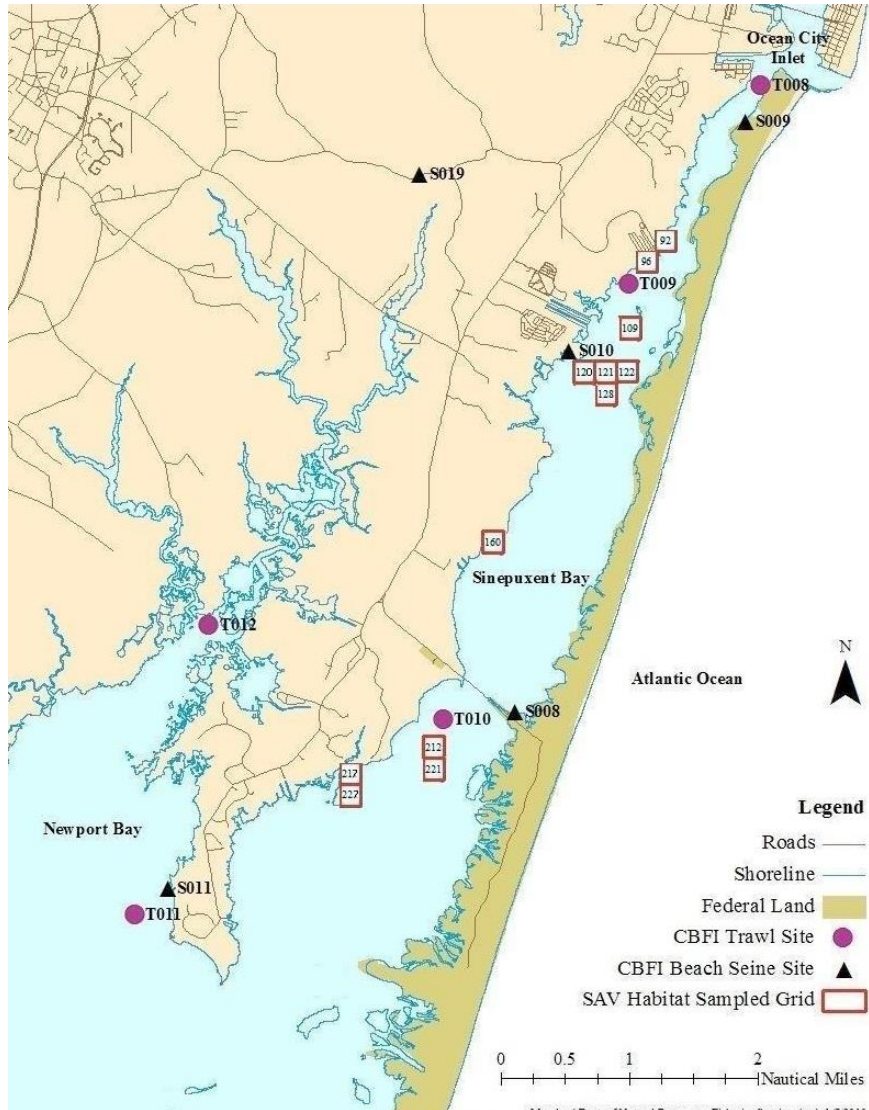
Survey Overview

- 2015 - Present
- September, Sinepuxent Bay
- Average number seine hauls per year is 16, not balanced by percent coverage of SAV
- 50-foot X 6 foot X 0.25 inch zippered mesh bag seine
- Area coverage is 400.5 m²

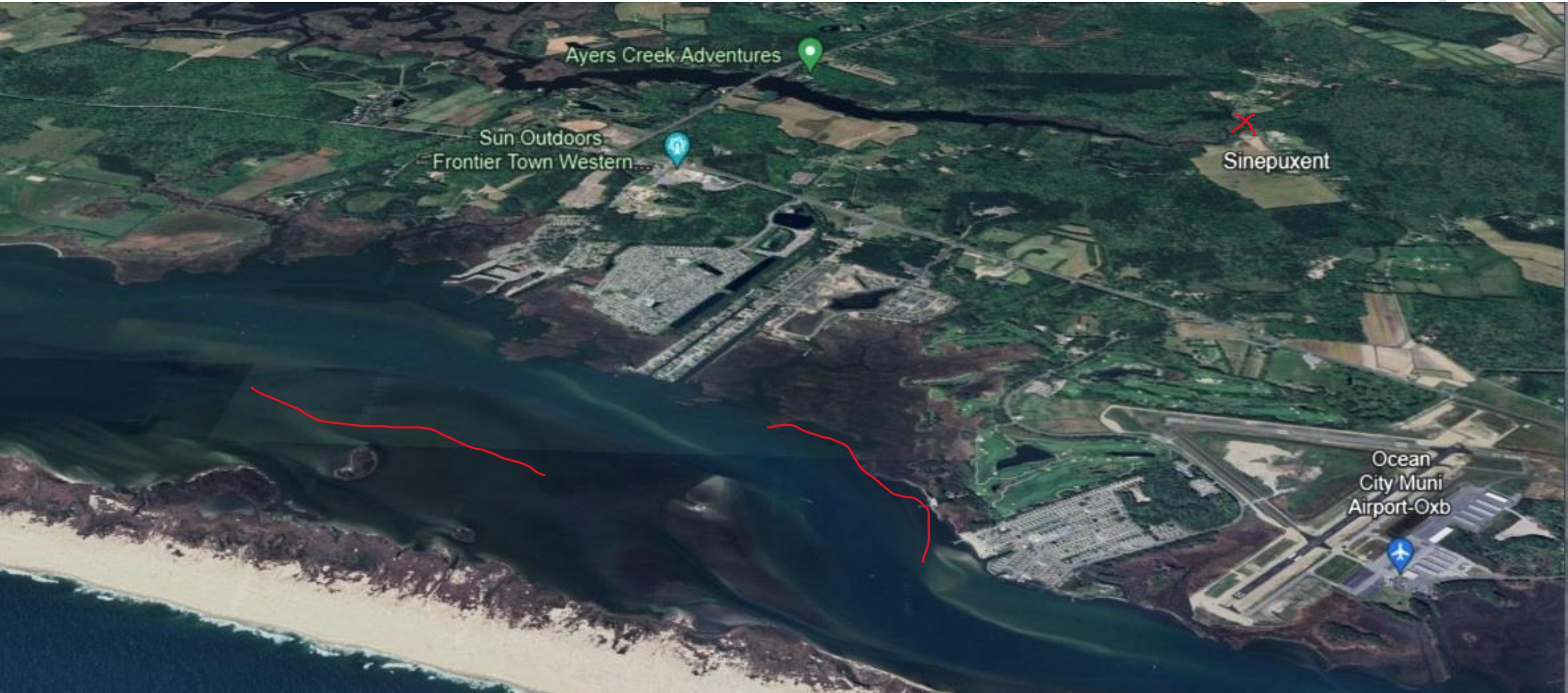
Data Outputs

- In consideration for the next Atlantic States Marine Fisheries Commission Tautog stock assessment
- Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan Compliance for Tautog
- US Fish & Wildlife Service Sport Fish Restoration Annual Report focused on fish catch per unit of effort by submerged aquatic vegetation characteristics
- Government, Non-Governmental Organization, and Research data requests

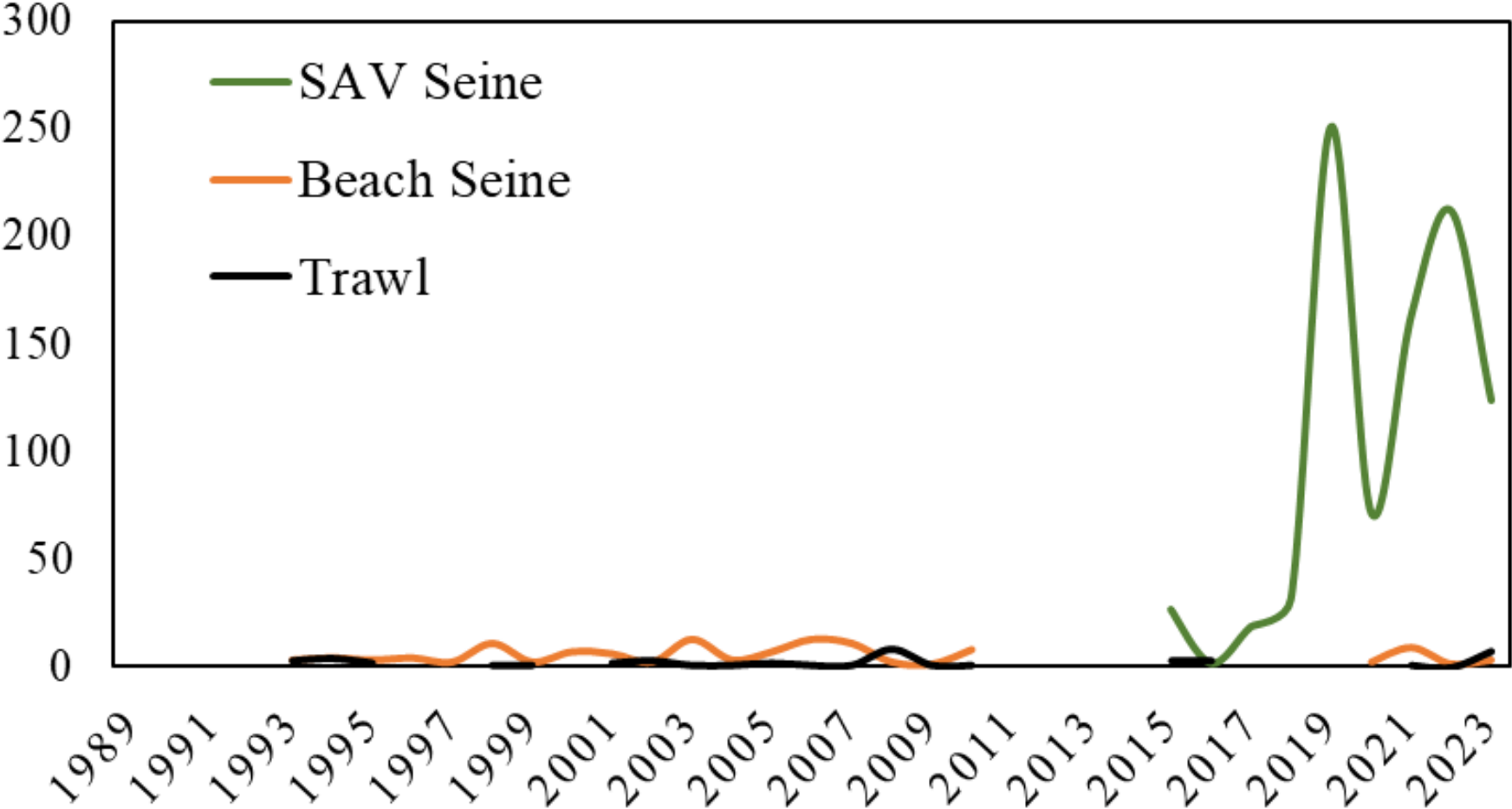
Submerged Aquatic Vegetation Habitat Survey



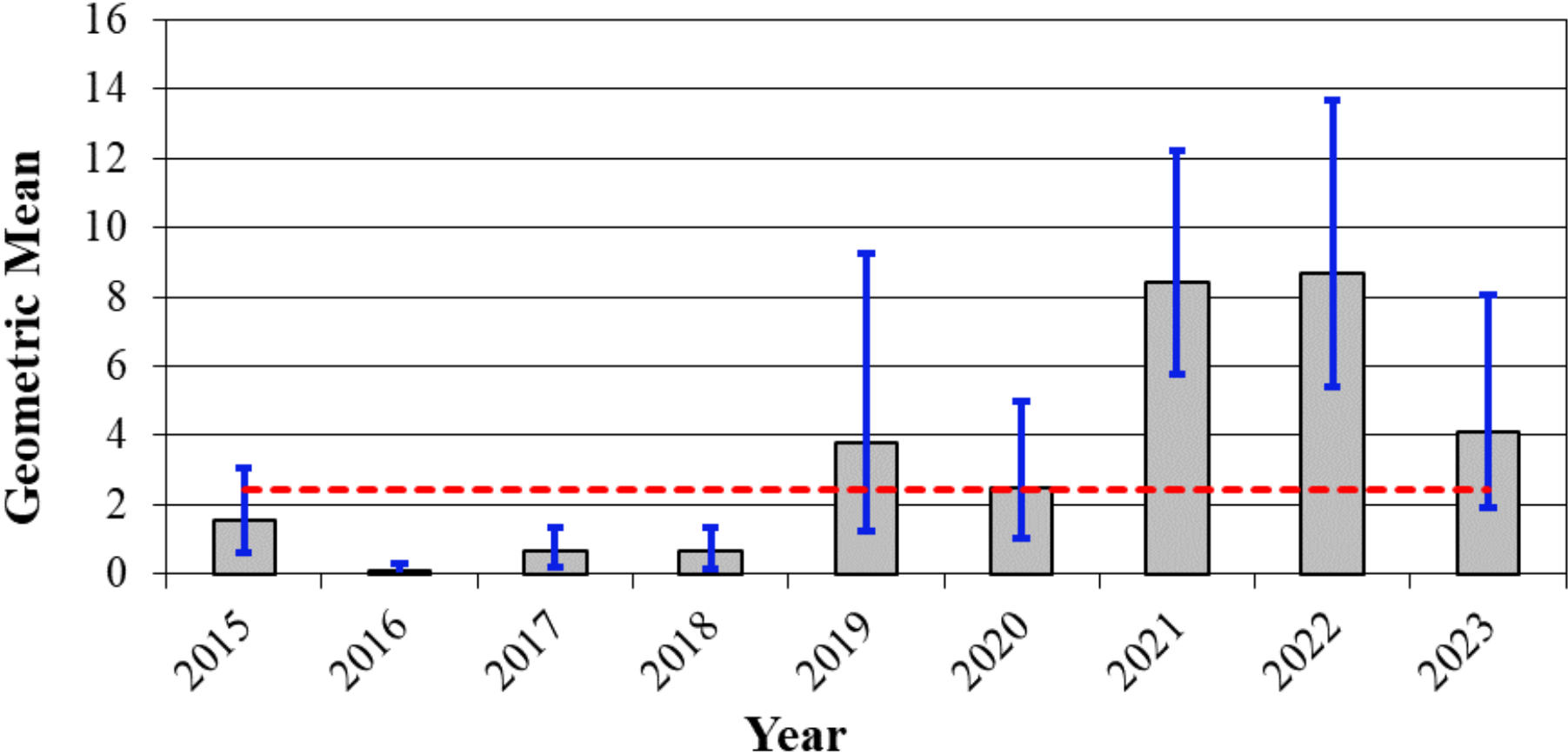
Submerged Aquatic Vegetation Habitat Survey



Juvenile Tautog Relative Abundance by Year and Survey



Juvenile Tautog Draft Relative Abundance Index



Habitat Comparison



Sand and Macroalgae



Mud and Macroalgae



Submerged Aquatic Vegetation



2015-2023 Relative Abundance of Fishes by Survey in September



Survey and total area swept by gear	SAV Habitat Survey (59,675 m ²)	Beach Seine Survey (155,063 m ²)	Trawl Survey (225,756 m ²)
Month	September		
Number of hauls or trawls	n = 149	n = 171	n = 180
	Relative abundance per beach seine or trawl		
Atlantic silverside (<i>Menidia menidia</i>)	53.9	88.4	0.1
Silver perch (<i>Bairdiella chrysoura</i>)	49.7	32.3	11.7
Tautog (<i>Tautoga onitis</i>)	6.1	0.1	0.02
Sheepshead (<i>Archosargus probatocephalus</i>)	3.1	1.3	0.03
Black sea bass (<i>Centropristis striata</i>)	2.8	0.2	0.6
Pigfish (<i>Orthopristis chrysoptera</i>)	2.1	1.8	0.3
Pinfish (<i>Lagodon rhomboides</i>)	1.4	1.9	0.3
Spot (<i>Leiostomus xanthurus</i>)	0.5	14.9	19.2
Summer flounder (<i>Paralichthys dentatus</i>)	0.2	1.9	1
Atlantic menhaden (<i>Brevoortia tyrannus</i>)	0.1	190.7	0.6
Blue crab (<i>Callinectes sapidus</i>)	31.1	23.9	14.6
Grass shrimp (<i>Palaemonetes sp.</i>)	17.3	0.7	0.3

2015-2023 Relative Abundance of Fishes by Survey in September



Specimen Name	Percent SAV Coverage			
	Low < 25%	Medium 26 - 50%	Medium - High 51 - 75%	High 76 - 100%
	(F _{3,148} = 1.2, p = n.s.)			
Black sea bass (<i>Centropristis striata</i>)	$\bar{x} = 0.7$ A	$\bar{x} = 3.1$ A	$\bar{x} = 4.0$ A	$\bar{x} = 2.4$ A
	(F _{3,148} = 2.63, p = n.s.)			
Tautog (<i>Tautoga onitis</i>)	$\bar{x} = 3$ B	$\bar{x} = 3.4$ B	$\bar{x} = 6.3$ A / B	$\bar{x} = 8.7$ A
	(F _{3,148} = 1.08, p = n.s.)			
Silver perch (<i>Bairdiella chrysoura</i>)	$\bar{x} = 15.6$ A	$\bar{x} = 54.3$ A	$\bar{x} = 58.6$ A	$\bar{x} = 53.9$ A
	(F _{3,148} = 0.95, p = n.s.)			
Blue crab (<i>Callinectes sapidus</i>)	$\bar{x} = 19.5$ A	$\bar{x} = 34.1$ A	$\bar{x} = 30.3$ A	$\bar{x} = 34.8$ A
	(F _{3,148} = 1.98, p = n.s.)			
Grass shrimp (<i>Palaemonetes sp.</i>)	$\bar{x} = 2.7$ B	$\bar{x} = 18.1$ A / B	$\bar{x} = 23.7$ A	$\bar{x} = 17.4$ A / B

Thanks for all the help over the years!



Program and Funding Page



<https://dnr.maryland.gov/fisheries/pages/coastal/publications.aspx>



Learn more about the US Fish & Wildlife Service Sport Fish Restoration Fund

<https://www.fws.gov/program/sport-fish-restoration>